

What is claimed is:

1 A multimode transmission system using TDMA
2 comprising:

3 a TDM switch coupled to a data signal, said data signal
4 comprising a plurality of satellite services, said TDM switch multiplexing said
5 data signal into a TDMA signal comprising a plurality of TDMA transmission
6 frames, each TDMA transmission frame having a plurality of downlink frame
7 time slots, wherein each of said downlink frame time slots is dynamically
8 allocated to one of said plurality of satellite services;

9 a modulator coupled to said TDM switch and receiving said
10 TDMA signal, said modulator modulating said TDMA signal to generate a
11 modulated TDMA signal; and

12 a beam-shaping, power-controlling, transmit antenna coupled to
13 said modulator and broadcasting said modulated TDMA signal using at least
14 one downlink beam, said at least one downlink beam having a shape and
15 number determined by said data signal.

1 2. The multimode transmission system using TDMA as
2 recited in claim 1, wherein one of said plurality of services comprises a timing
3 beacon synchronization data signal.

1 3. The multimode transmission system using TDMA as
2 recited in claim 1, wherein one of said plurality of services comprises a multi-
3 cast/broadcast data service.

1 4. The multimode transmission system using TDMA as
2 recited in claim 3, wherein said multi-cast/broadcast data service comprises a
3 cell-cast function.

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1 5. The multimode transmission system using TDMA as
2 recited in claim 4, wherein said cell-cast function comprises multi-casting to
3 individual downlink cells within an uplink cell.

1 6. The multimode transmission system using TDMA as
2 recited in claim 1, wherein one of said plurality of services comprises a
3 calibration data signal.

1 7. The multimode transmission system using TDMA as
2 recited in claim 1, wherein one of said plurality of services comprises a point-to-
3 point data service.

1 8. The multimode transmission system using TDMA as
2 recited in claim 1, wherein each of said plurality of downlink frame time slots is
3 a fixed length of time.

1 9. The multimode transmission system using TDMA as
2 recited in claim 1, wherein each of said plurality of downlink frame time slots is
3 a variable length of time.

1 10. The multimode transmission system using TDMA as
2 recited in claim 1, wherein said at least one downlink beam has a variable power
3 assigned to ensure link availability and bit-error-rate performance for a coverage
4 area of said at least one downlink beam.

1 11. The multimode transmission system using TDMA as
2 recited in claim 10, wherein a transmission information rate of is altered to
3 ensure link availability and bit-error-rate performance for a coverage area of
4 said at least one downlink beam.

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1 12. A satellite system comprising:
2 a ground station;
3 a satellite in orbit and in communication with said ground
4 station, said satellite having a multimode transmission system using TDMA
5 comprising:

6 a TDM switch coupled to a data signal, said data signal
7 comprising a plurality of satellite services, said TDM switch
8 multiplexing said data signal into a TDMA signal comprising a plurality
9 of TDMA transmission frames, each TDMA transmission frame having
10 a plurality of downlink frame time slots, wherein each of said downlink
11 frame time slots is dynamically allocated to one of said plurality of
12 satellite services;

13 a modulator coupled to said TDM switch and receiving
14 said TDMA signal, said modulator modulating said TDMA signal to
15 generate a modulated TDMA signal; and

16 a beam-shaping, power-controlling, transmit antenna
17 coupled to said modulator and broadcasting said modulated TDMA
18 signal using at least one downlink beam, said at least one downlink
19 beam having a shape and number determined by said data signal.

1 13. The satellite system as recited in claim 1, wherein one of
2 said plurality of services comprises a timing beacon synchronization data signal.

1 14. The satellite system as recited in claim 1, wherein one of
2 said plurality of services comprises a multi-cast/broadcast data service.

1 15. The satellite system as recited in claim 1, wherein one of
2 said plurality of services comprises a calibration data signal.

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16. The satellite system as recited in claim 1, wherein one of said plurality of services comprises a point-to-point data service.
17. A method for satellite system synchronization comprising the steps of:
- generating a data signal comprising a plurality of satellite services;
 - generating a timing signal;
 - multiplexing said data signal to generate a TDMA signal having a plurality of downlink frames each downlink frame having a plurality of downlink frame slots, wherein each of said plurality of downlink frame slots is dynamically allocated to one of said plurality of satellite services;
 - modulating said TDMA signal to generate a modulated TDMA signal;
 - broadcasting said modulated TDMA signal using at least one downlink beam, said at least one downlink beam having a shape and number determined by said data signal.